New Developments - Air Permitting & Compliance

- NAAQS Challenges
- PM 2.5 Implementation & Testing

New Challenges: Ozone NAAQS Standard

1-hr ozone standard:

- 1-hr standard was 0.12 ppm (4th highest ozone level at monitor over past 3 years)

8-hr ozone standard (1997):

- 8-hr standard is 0.08 ppm (effectively 0.084)
  - 6/07 – State Implementation Plans due
  - 2007 to 2021 – Attainment Required

New 8-hr ozone standard 3/08:

- 8-hr standard - 0.075 ppm (avg. of 4th highest conc., 3 yr)
  - 3/08 - Final Ozone NAAQS Standard Set
  - 3/09 – States Recommend non-attainment areas
  - 3/10 – EPA finalizes Non-attainment designations
  - 2013 – State Implementation Plans due
  - 2013 to 2030 – Attainment Required

New Challenges: 8-hr Ozone Requirements

Impact of being non-attainment for Ozone:

VOC and NOx Retrofit Controls on Sources

- Lower emission limits (no NOx waivers)
- Increased site compliance cost for RACT and RACM

- Permitting:
  - Costly LAER vs. BACT controls on new/modified sources
  - Emission offsets needed (Issue – cost & availability)
    - States need to develop emission trading mechanisms
  - Lower NSR & Title V permitting thresholds
  - Higher emission offset ratios in Subpart 2 areas

8-hr Ozone NAAQS Implementation

Ozone Classifications

"BASIC" Non-attainment Areas

Subpart I Requirements:

- Attainment in 5 years
- RACT & RACM (Reasonably Available Control Measures)
- NSR – LAER & Offset Ratio of 1.1:1
- Major Source Threshold of 100 TPY

8-hr Ozone NAAQS Implementation

Non-Attainment – Requirements for Classified Areas - Subpart 2 Requirements

Classification	Marginal	Moderate	Serious	Severe	Extreme
8-hr Design Value, ppm	0.085-0.092	0.092-0.107	0.107-0.120	0.120-0.127	0.127-0.187
Attainment, yrs	3	6	9	15/17	20
Major Source Threshold, TPY	100	100	50	25	10
Offset Ratios	1.1:1	1.15:1	1.2:1	1.3:1	1.5:1

8-hr Ozone NAAQS Implementation Update

"Classified Areas"

Additional Subpart 2 Requirements

Marginal Areas

- RACT per Section 172 (b) (pre-1990 CAA)

Moderate Areas

- 15% reduction w/I 6 years (VOC, NOx if needed)
- RACT per Section 172 (c) (post 1990 CAA rqts)
- Automobile I/M, Vapor Recovery

Serious Areas

- Additional 3%/yr reductions starting year 6
- Enhanced I/M, Clean Fuel Vehicle Programs

Severe & Extreme Areas

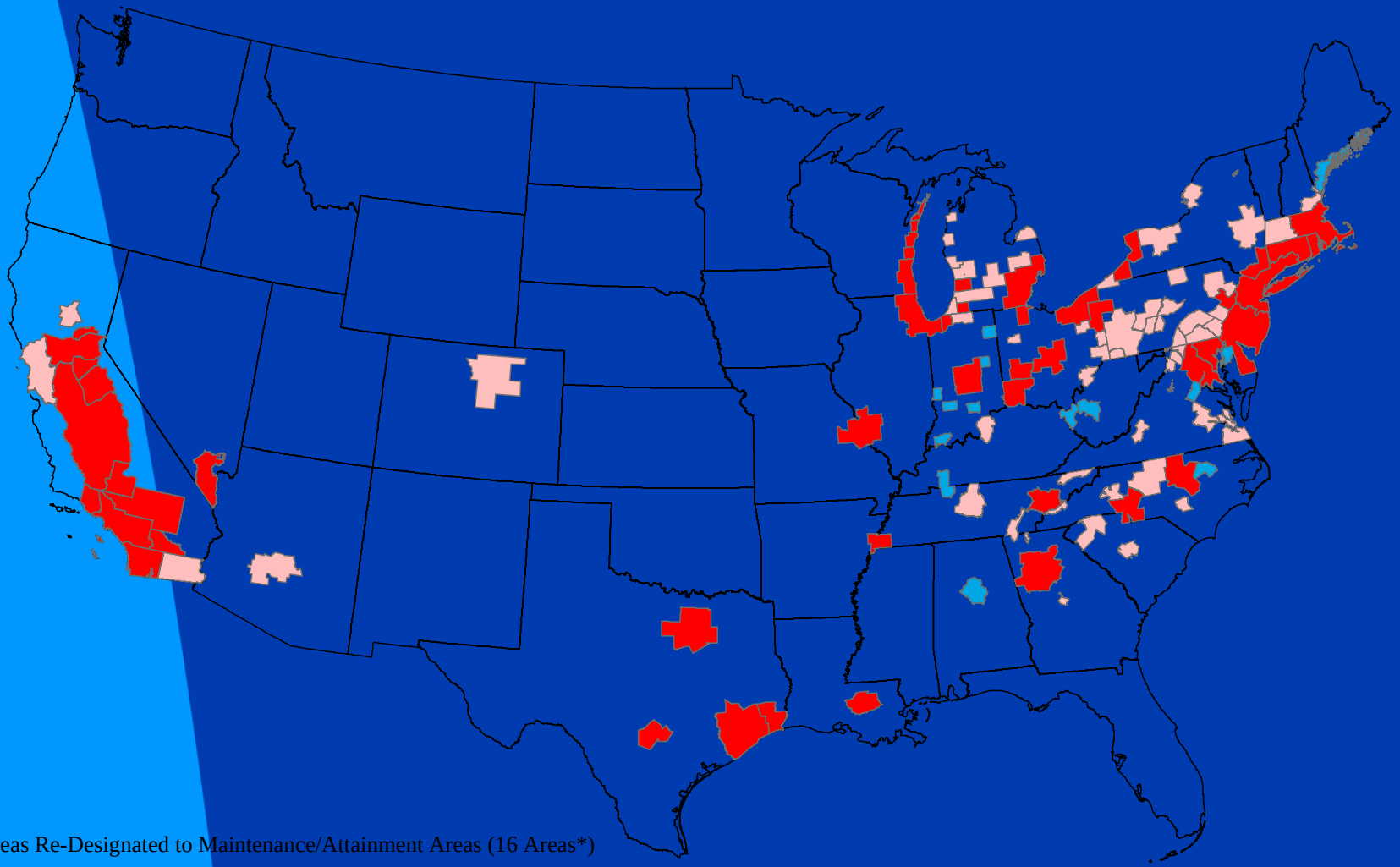
- Vehicle Miles Traveled - Transportation Controls,
- Section 185 Emission Fee Sanctions ($5000+/ton/year)

Ozone Implementation Rule – Phase 1 Litigation Outcome

12/22/06 DC Circuit Ruling & 6/07 clarification

- EPA must reclassify some non-attainment areas.
- Severe/Extreme Areas for the 1-hr ozone standard remain subject to Costly Section 185 Fees

Current 1997 Ozone Nonattainment Area Status
(based on 2003-2005 air quality data)



- Areas Re-Designated to Maintenance/Attainment Areas (16 Areas*)
- Designated Nonattainment Areas Below the Level of the Standard, (58 Areas**)
- Designated Nonattainment Areas Above the Level of the Standard, (52 Areas)

1 Area had incomplete data for 2003-2005

****4 Areas had incomplete data for 2003-2005***

Attainment Status as of March 19, 2007

2008 Ozone NAAQS Timeline

New 8-hr ozone standard 3/08:

- 8-hr standard - 0.075 ppm
  - 3/08 - Final Ozone NAAQS Standard Set
  - 3/09 – States Recommend non-attainment areas
  - 3/10 – EPA finalizes Non-attainment designations
  - 2013 – State Implementation Plans due
  - 2013 to 2030 – Attainment Required

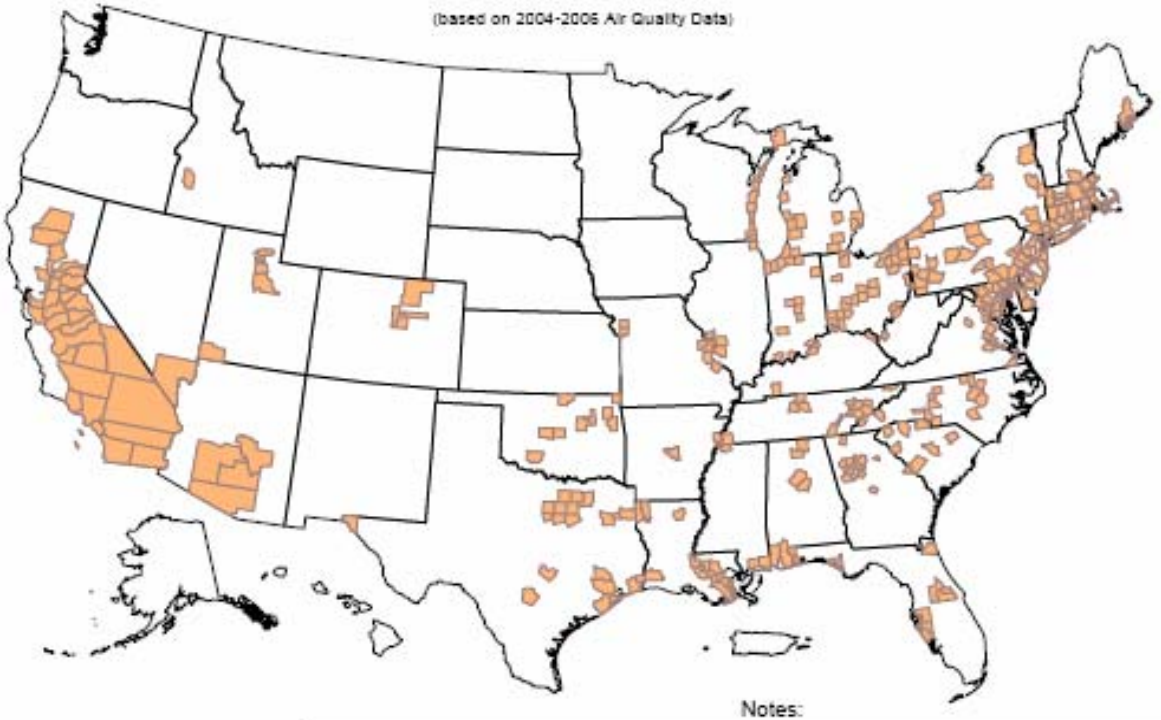
3/08 Ozone NAAQS Attainment

EPA United States Environmental Protection Agency

Estimates are based on the most recent data (2004 – 2006). EPA will not designate areas as nonattainment on these data, but likely on data from 2006 – 2008 or later, which we expect to show improved air quality.

Counties with Monitors Violating the 2008 8-Hour Ozone Standard of 0.075 parts per million (ppm)

(based on 2004-2006 Air Quality Data)



Notes:

[1] 346 monitored counties violate the 2008 8-hour ozone standard of 0.075 parts per million (ppm).

[2] Monitored air quality data can be obtained from the AQS system at http://www.epa.gov/ttn/airs/airsaqs/

3/08 Ozone NAAQS Proposal
in 2020 – with CAIR

EPA United States Environmental Protection Agency

Counties with Monitors Projected to Violate the 2008 8-Hour Ozone Standard of 0.075 parts per million (ppm) in 2020

Notes:

[1] 28 counties are projected to violate the 2008 8-hour ozone standard of 0.075 parts per million (ppm).

[2] Future ozone levels were projected only for counties with monitoring data and within the contiguous 48 states.

[3] Modeled emissions reflect the expected reductions from federal programs including the Clean Air Interstate Rule, the Clean Air Mercury Rule, the Clean Air Visibility Rule, the Clean Air Nonroad Diesel Rule, the Light-Duty Vehicle Tier 2 Rule, the Heavy Duty Diesel Rule, proposed rules for Locomotive and Marine vessels and for Small Spark-Ignition Engines; as well as illustrative state and local level mobile and stationary source controls identified for the purpose of attaining the 1997 ozone and 2006 PM2.5 standards. States may choose to apply different control strategies for implementation.

New Challenges: PM 2.5 NAAQS Standard

PM-10 standards

- 24-hr standard is 150 ug/m3
- Annual standard is 50 ug/m3

PM 2.5 standard (1997):

- 24-hr Standard is 65 ug/m3
- Annual Standard is 15 ug/m3
  - 4/08 – State Implementation Plans due
  - 2010 – Attainment Required

New 24-hr PM2.5 standard (11/06):

- 24-hr standard reduced from 65 to 35ug/m3
  - 12/07 State non-attainment recommendations to EPA
  - 8/08 – EPA non-attainment recommendations
  - 12/18/09 – Final Non-attainment designations made by EPA
  - 4/09 – State Designations effective
  - 4/2013 - State Implementation Plans due
  - 4/2015 – Attainment Required

New Challenge:
PM 2.5 Implementation

Impact of being non-attainment for PM 2.5:

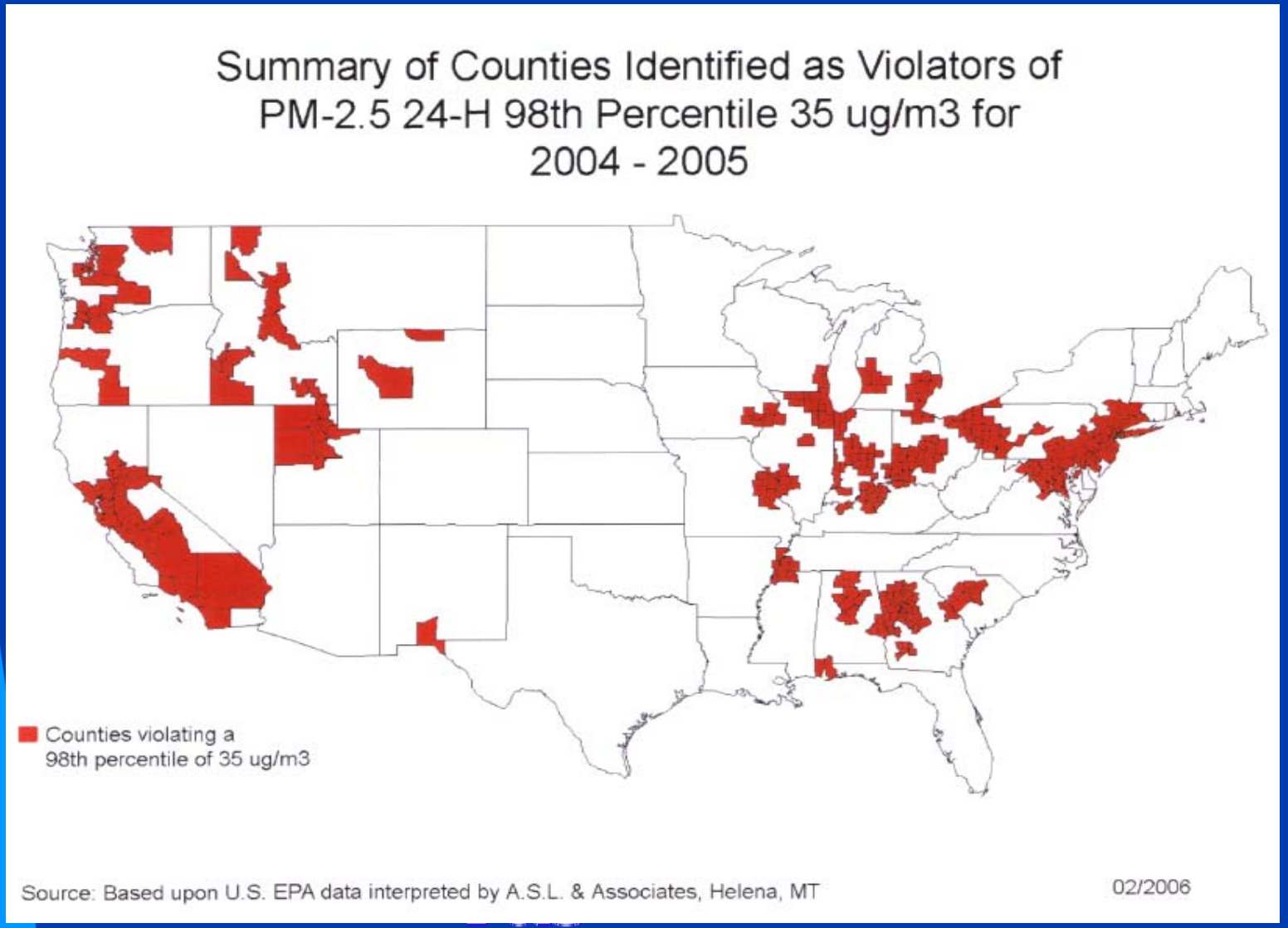
- Retrofit Controls on Precursor Emissions
  - NOx, SOx are precursers
  - Ammonia, VOC may be considered precursors
  - Increased site compliance cost for RACT/RACM
- Permitting:
  - LAER vs. BACT controls on new/modified sources
  - Emission offsets needed (Issue – cost & availability)
  - States need to develop emission trading mechanisms

Timeline for 24-hr PM2.5 NAAQS

New 24-hr PM2.5 standard (11/06):

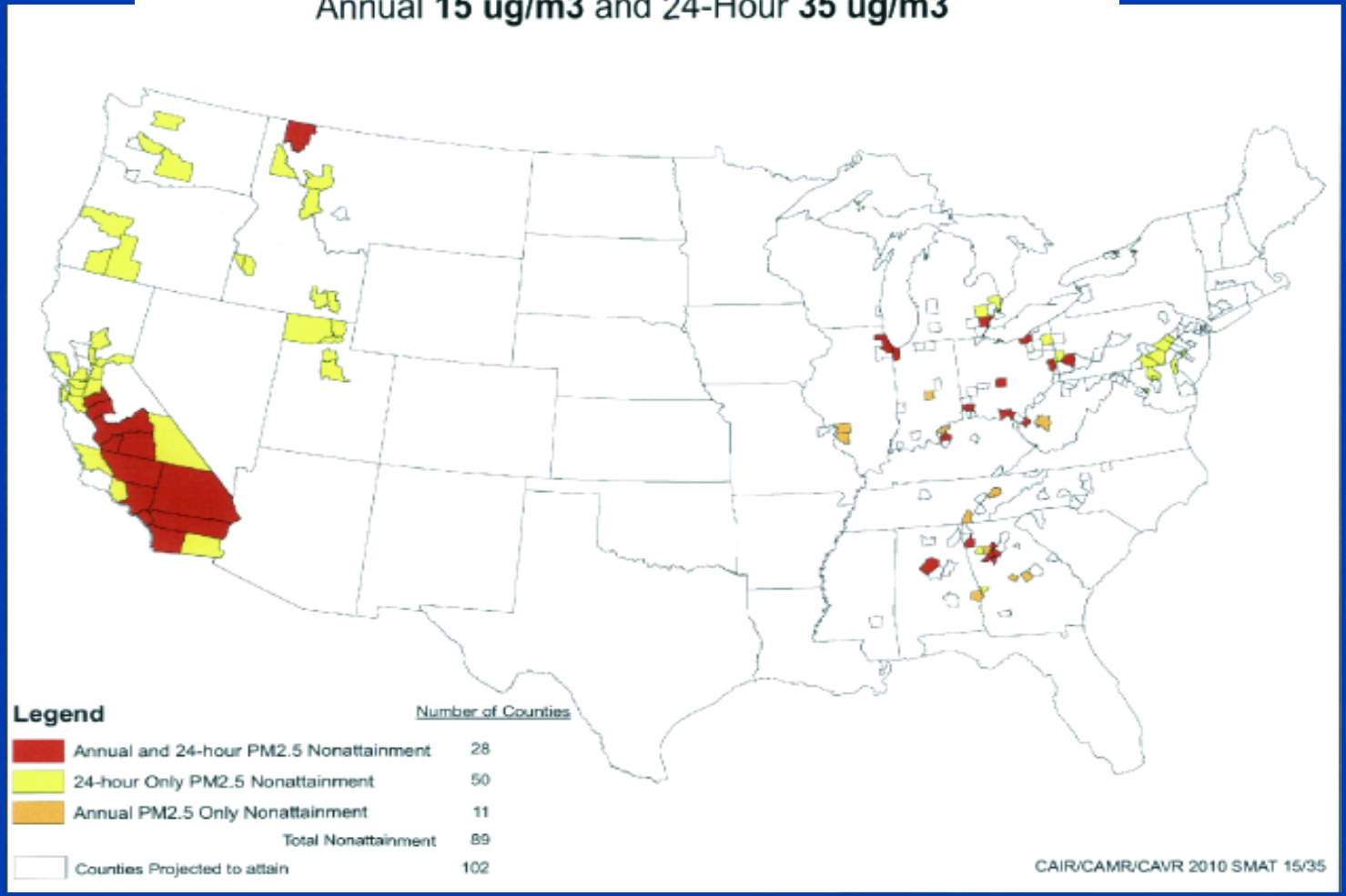
- 24-hr standard reduced from 65 to 35ug/m3
  - 12/07 State non-attainment recommendations to EPA
  - 8/08 – EPA non-attainment recommendations
  - 12/18/09 – Final Non-attainment designations made by EPA
  - 4/09 – State Designations effective
  - 4/2013 - State Implementation Plans due
  - 4/2015 – Attainment Required

11/06 Tightened 24-hr PM 2.5 Standard
Projected Non-attainment Areas

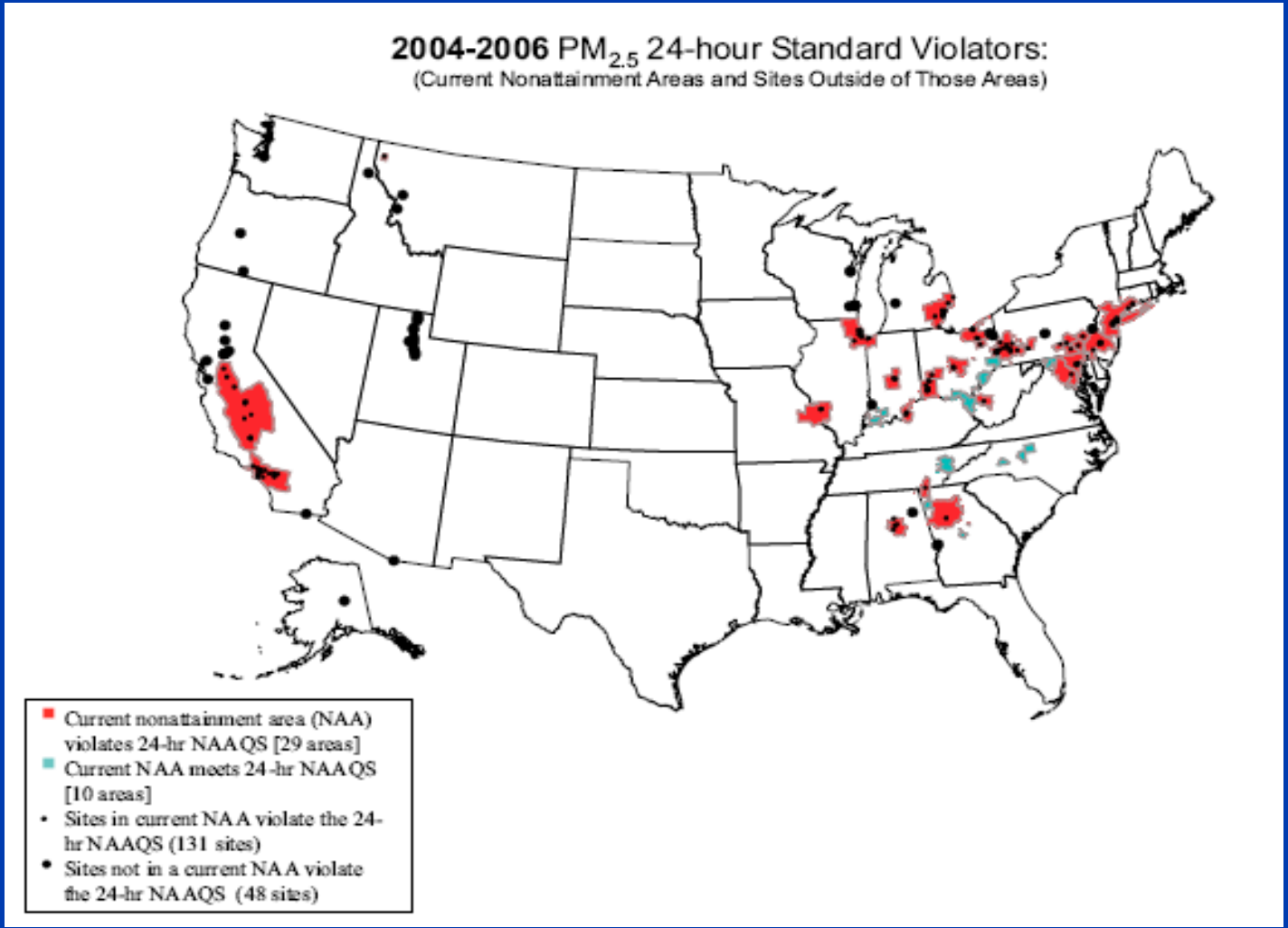


Tightened 24-hr PM 2.5 Standard
2010 Non-attainment Projections

Counties Projected to Exceed the PM2.5 NAAQS in 2010
Based on EPA Modeling*
Annual **15 ug/m3** and 24-Hour **35 ug/m3**



11/06 Tightened 24-hr PM 2.5 Standard ACTUAL Non-attainment Areas



Additional Challenge – Regional Haze!

Objective:

Achieve Natural Background Visibility Levels in 60 years (by 2064)

- Control of PM 2.5, NOx, SOx, (VOC)
- Timeline
  - Final Rule 1999
  - SIP submittals due 4/2008
  - SIP revisions 2018 and every 10 years thereafter
- Plan development by RPOs
  - OTC, LADCO, SAMI/SESARM, CENRAP, WRAP

New Challenge – Regional Haze

BART Controls (NOx, SOx, PM)

7/05 - EPA finalized BART Guidance

Presumptive controls:

- SO2 – 95% control or 0.15 lb/MMBTU for coal fired EGUs >200 MW
- SO2 – oil-fired units – limit sulfur content of fuel to 1% max
- NOx – tight year round limits where SCR or SNCR is in place coal fired units
- NOx – No presumptive limits for oil or gas-fired units

BART Timeline (The Big Picture)

- Jan 2006: RPOs provide guidance to states
- Dec 2007: State SIPs for Regional Haze due
  - June 2007 – Ozone SIPs due
  - April 2008 – $PM_{2.5}$ SIPs due
  - 2009 / 2010 – CAIR Phase I
- ~2013-2015: BART controls installed

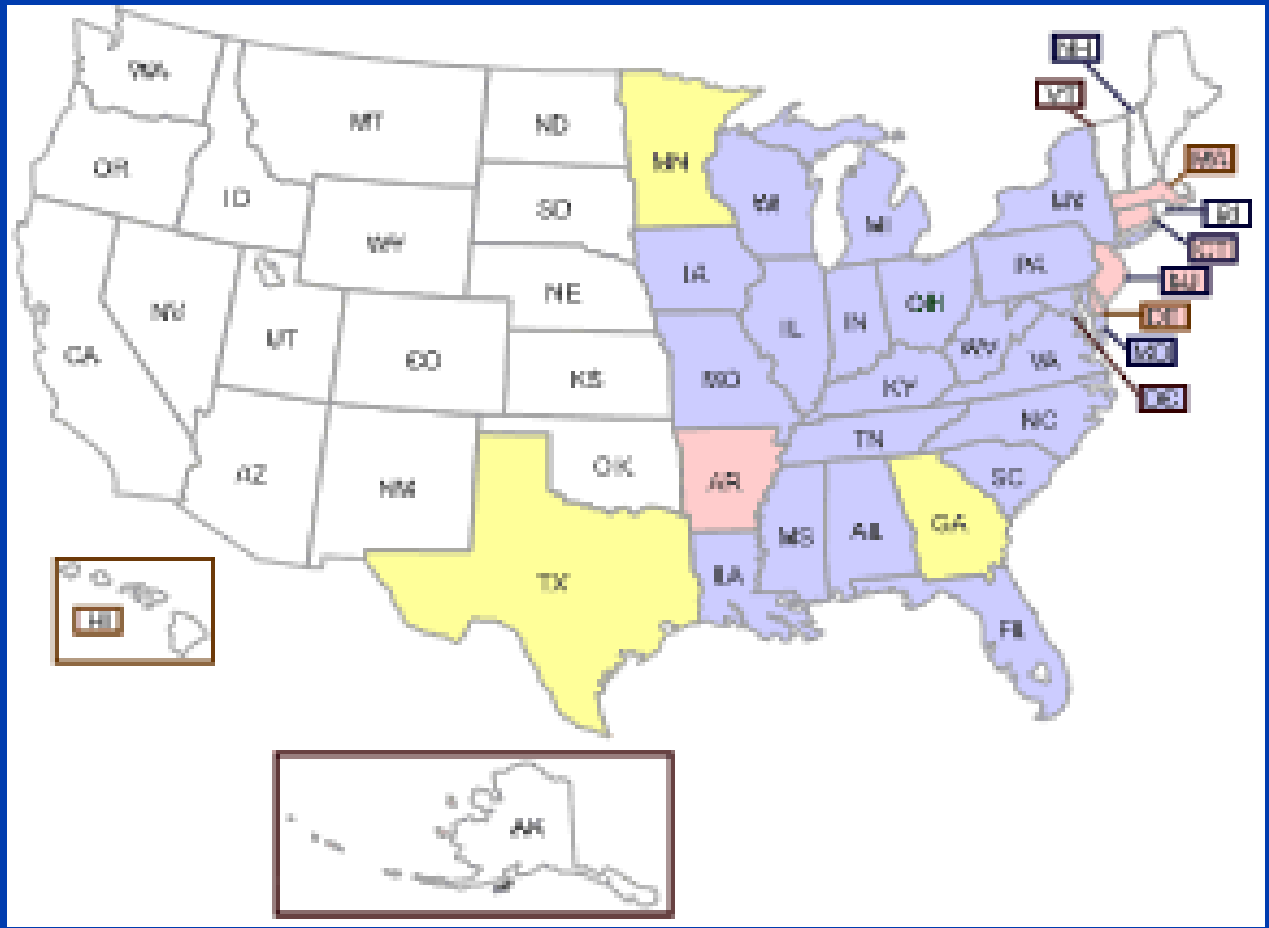

Regional Planning Organizations
Mid-Atlantic/Northeast Visibility Union
Western Regional Air Partnership
Midwest Regional Planning Organization
Central States Regional Air Partnership
Visibility Improvement State and Tribal Association of the Southeast

Source: EPA

Clean Air Interstate Rule

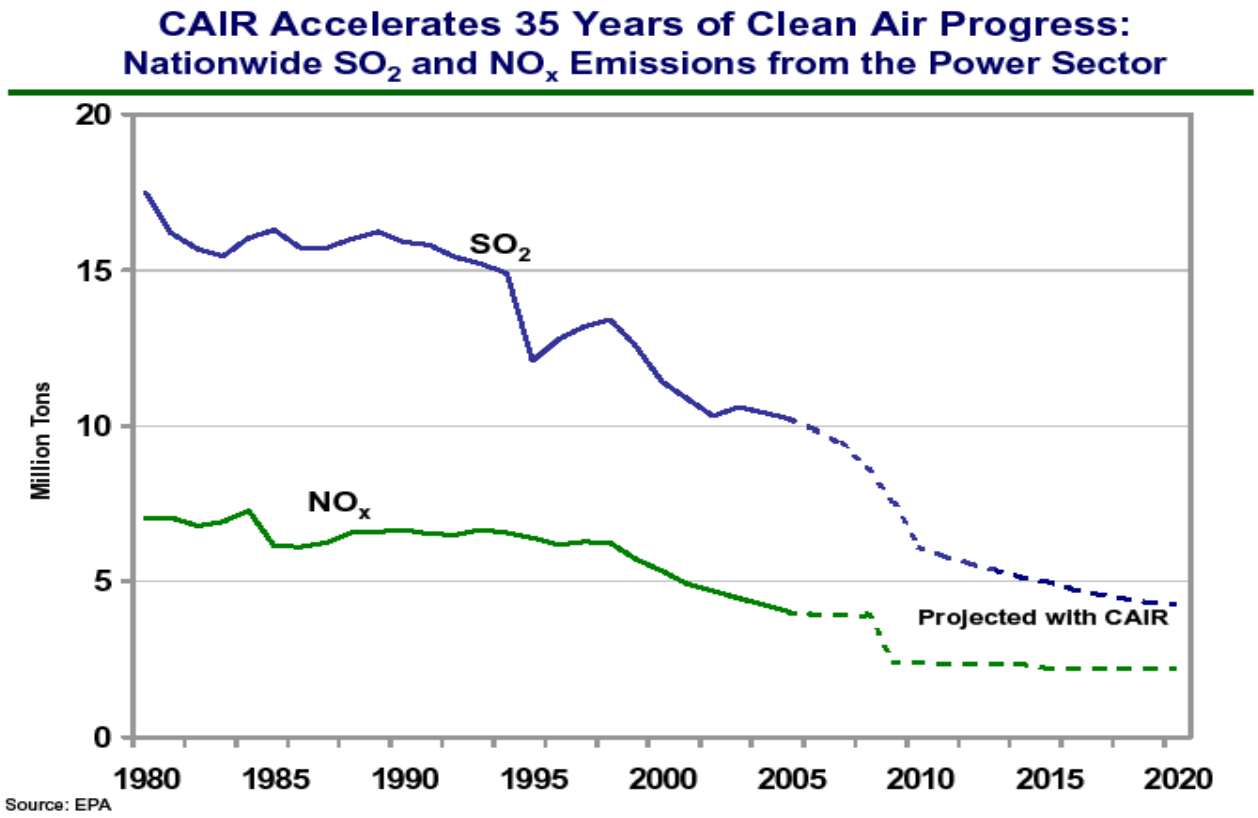
- CAIR annual programs reduce NOx & SO_2 from Utilities
  - SO_2 reduction >70% vs. 2003 baseline
  - NOx reduction >60% vs. 2003 baseline
  - NOx reduction is year round – not just in ozone season.
- CAIR includes opt-in for non-utilities
- CAIR ozone season program
  - Industrial NOx SIP sources can trade w/ Util
  - States may shift NOx SIP credits into CAIR rule

CAIR States



- ozone and particles
- ozone only
- particles only
- not covered by CAIR

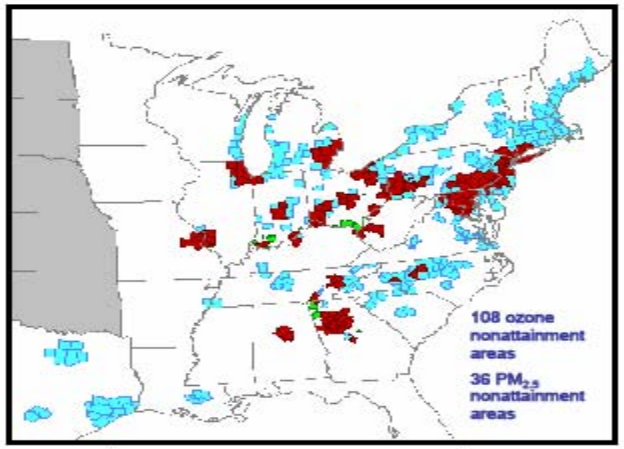
CAIR Emission Reductions



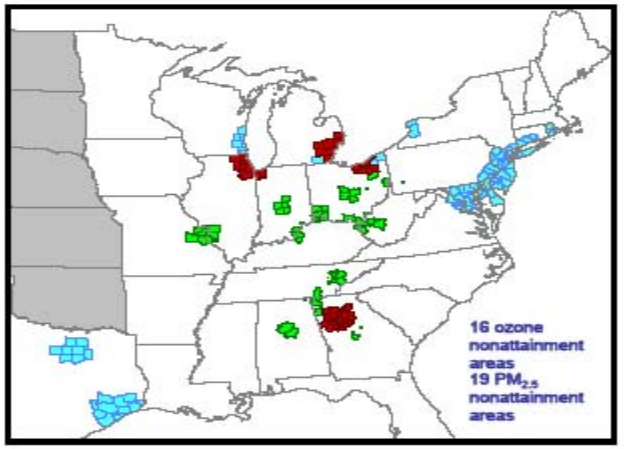
Benefits of CAIR - 2010

Ozone and Particle Pollution: CAIR, together with other Clean Air Programs, Will Bring Cleaner Air to Areas in the East - 2010

Ozone and Fine Particle Nonattainment Areas (April 2005)



Projected Nonattainment Areas in 2010 after Reductions from CAIR and Existing Clean Air Act Programs



Nonattainment areas for 8-hour ozone pollution only

Nonattainment areas for fine particle pollution only .

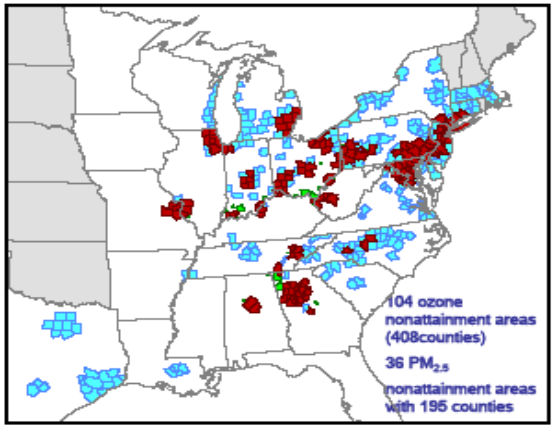
Nonattainment areas for both 8-hour ozone and fine particle pollution

Projections concerning future levels of air pollution in specific geographic locations were estimated using the best scientific models available. They are estimations, however, and should be characterized as such in any description. Actual results may vary significantly if any of the factors that influence air quality differ from the assumed values used in the projections shown here.

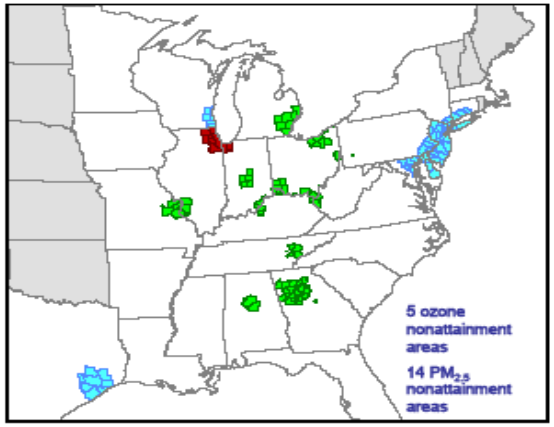
Benefits of CAIR - 2015

Ozone and Particle Pollution: CAIR, together with other Clean Air Programs, Will Bring Cleaner Air to Areas in the East - 2015

Ozone and Fine Particle Nonattainment Areas (April 2005)



Projected Nonattainment Areas in 2015 after Reductions from CAIR and Existing Clean Air Act Programs



Nonattainment areas for 8-hour ozone pollution only

Nonattainment areas for fine particle pollution only

Nonattainment areas for both 8-hour ozone and fine particle pollution

Projections concerning future levels of air pollution in specific geographic locations were estimated using the best scientific models available. They are estimations, however, and should be characterized as such in any description. Actual results may vary significantly if any of the factors that influence air quality differ from the assumed values used in the projections shown here.

CAIR RULE VACATED - Now remanded

States must still meet NAAQS timelines

- PM SIP was due 4/08
- Ozone SIP was due 6/07

Solution? The COURT Remanded

- Legislative fix unlikely
- States implementing replacement rules
- NACAA guidance recommends stringent industrial boiler controls

EPA - Notice of Deficiency

Status of Ozone, PM2.5 and Regional Haze SIPs (MRPO Region)

- Ozone
  - 6 SIPs due 6/07 – 2 submitted
  - Findings for “failure to submit Issued 3/08
- PM2.5
  - 17 SIPs due 4/08 – 13 submitted
- Regional Haze
  - 5 SIPs due 12/07 – none submitted

PM 2.5 Implementation and Testing

- 1997 - Promulgation of PM 2.5 Standard
  - PM 2.5 monitoring network established
  - Collection of 3 years of ambient data
- 2/04 – States recommend designations
- 4/05 – Non-attainment designations effective
- 11/05 – EPA proposes implementation rule
- 4/07 – EPA finalizes implementation rule
- 4/08 – State SIPs due
- 2010 – Attainment required

PM 2.5 Implementation and Testing

SIPs due 4/08 should Include:

- PM 2.5 Emission Inventory
- Control Measures
- Attainment Demonstration

Yet, basic test method for measuring PM 2.5 from point sources stacks was lacking

PM 2.5 Implementation and Testing

Proposed PM 2.5 Implementation Rule:

- Condensables are an important component
  - Based on current AP-42 data, EPA estimates that 78% of PM 2.5 emissions are condensable.
- Addition of condensables may increase direct PM 2.5 by a factor of 5 or more.
- Condensable PM 2.5 should be included in
  - emission inventories
  - control measures and
  - emission limits
- States must adopt Reference Method 202 and CTM-40 (which uses RM 202) for SIP approval!

PM 2.5 Implementation and Testing

PM 2.5 Stack Test Method Problem:

- Measurement of Condensable PM (RM202)

RM 202 Issues:

- Particulates are created in test method
  - Probe heated to 250 degrees F
  - Gases then condensed in water-filled impingers sitting in ice bath
  - Impinger contents extracted - extract & remaining aqueous fractions dried and weighed
- Artifacts produced by water and air chemistry result in artificially high condensable PM readings.
- Other interferences – SO2, Ammonia - options in methods are insufficient

PM 2.5 Implementation and Testing

CTM-40 uses RM 202 to quantify condensables

But:

- RM 202 overestimates condensables
- Uses cold water to condense out water vapor and organic and inorganic vapors
- The additional water and air chemistry produces weighable testing artifacts.

Because this method leads to unrealistically high levels of condensable emissions, NAS recommended development of an air dilution method for PM 2.5 Testing

PM 2.5 Implementation and Testing

PM 2.5 Test methods under development

CTM – 40 – uses RM 202 for condensables

- not yet an approved test method
- practical limitations restrict application

CTM – 39 – Air Dilution Method

- under development
- impractical size
- research tool only

ASTM D22.03-W1752 Draft - Air Dilution Method

- under development
- not commercially available

PM 2.5 Implementation and Testing

In implementation proposal, EPA recognized:

- Addition of condensables may increase direct PM 2.5 by a factor of 5 or more.
- Changes in source test methods will require re-evaluation and revision of emission limits.
- NSPS and other emission limits were set based on filterable solids without condensable emissions. A simple factor cannot be applied to all limits to make this correction.
- Most current emission inventories data excludes condensables – few emission factors include them.

PM 2.5 Implementation and Testing

Implementation proposal issues:

- Would have required condensables measured via CTM 40 w/ RM 202 for inventory, control measures and limits.
  - State emission inventories would be grossly inflated
  - Existing federal and state standards would automatically become more stringent without case-by-case evaluation of standards
  - Control measures developed would be based on questionable condensable data and would not necessarily result in real reductions
- Once new air dilution method in place,
  - Prior emissions data used for inventories, RACT and SIP limits would be meaningless.
  - PM Implementation would be a mess!

Final PM 2.5 Implementation Rule (FR 20586, 20651-59)

Method 202:

- By 12/07 EPA and others will complete work to characterize artifact formation and other uncertainties related to RM 202.
- Result - identification of possible test modifications to minimize uncertainties.
- **By 12/08** EPA will propose changes to Method 202 to measure condensable PM 2.5

Final PM 2.5 Implementation Rule (FR 20586, 20651-59)

CTM 039:

- EPA believes a dilution method will eliminate artifact formation and provide the most accurate quantification of direct PM 2.5.
- EPA will perform additional validation of CTM-39 to characterize precision.
- EPA plans to continue participation in the ASTM D22 committee to develop and publish a dilution sampling method and to encourage approval of this consensus method.

Final PM 2.5 Implementation Rule (FR 20586, 20651-59)

Transition Period

Comment: EPA should allow States to base their initial 2008 SIPs on NOx, SO2 and filterable PM or PM10 (as a surrogate for filterable PM 2.5). During this transition period a source should be able to continue using Method 5, Method 17 or whatever method was used to set the underlying limit contained in the source's permit. It is unrealistic to develop SIP revisions addressing condensable emissions by 4/08.

Response: EPA agrees a transition period should be allowed to provide time to resolve and adopt appropriate testing procedures for condensable PM emissions, to collect total (filterable and condensable) PM 2.5 emissions data that are more representative of the sources in their areas and develop effective regulations for control of direct PM 2.5 including condensable PM.

Final PM 2.5 Implementation Rule (FR 20586, 20651-59)

Transition Period

- EPA has decided to provide a transition period for developing emissions limits and regulations for condensable PM 2.5
- EPA will not require that emission limits included in the 2008 submittals account for the condensable fraction of direct PM 2.5 and will not require that limits for total direct PM2.5 including condensable PM be established.
- The period of transition for establishing limits for condensable direct PM2.5 will end January 1, 2011.

Final PM 2.5 Implementation Rule (FR 20586, 20632)

Emission Limits:

- "When a source implements either of these test methods addressing condensable emissions the State will likely need to revise the source's emission limit to account for those emissions that were previously unregulated." (FR 20632)

Final PM 2.5 Implementation Rule (FR 20586, 20651-59):

Role of Condensable PM Emissions in Defining RACT

Comment: States must reassess and revise emission limits if States adopt methods for measuring direct PM 2.5 including condensable PM where not required previously. Development of existing PM limits did not reflect methods that measure condensable or filterable PM 2.5 and therefore are not enforceable using a new or different test method.

Response: "EPA agrees…methods for measuring filterable and condensable PM provide data that are significantly different than do methods often used in implementing many current regulations (i.e. filterable plus condensable vs filterable PM only). The existing PM emissions regulations implementing many current SIPs have focused almost exclusively on filterable PM at stack conditions…with little or no measurement of condensable PM… …Implementation of any new or revised rules or test methods should be prospective and clearly differentiated from existing regulations to avoid confusion over status of compliance relative to existing PM emissions limits."

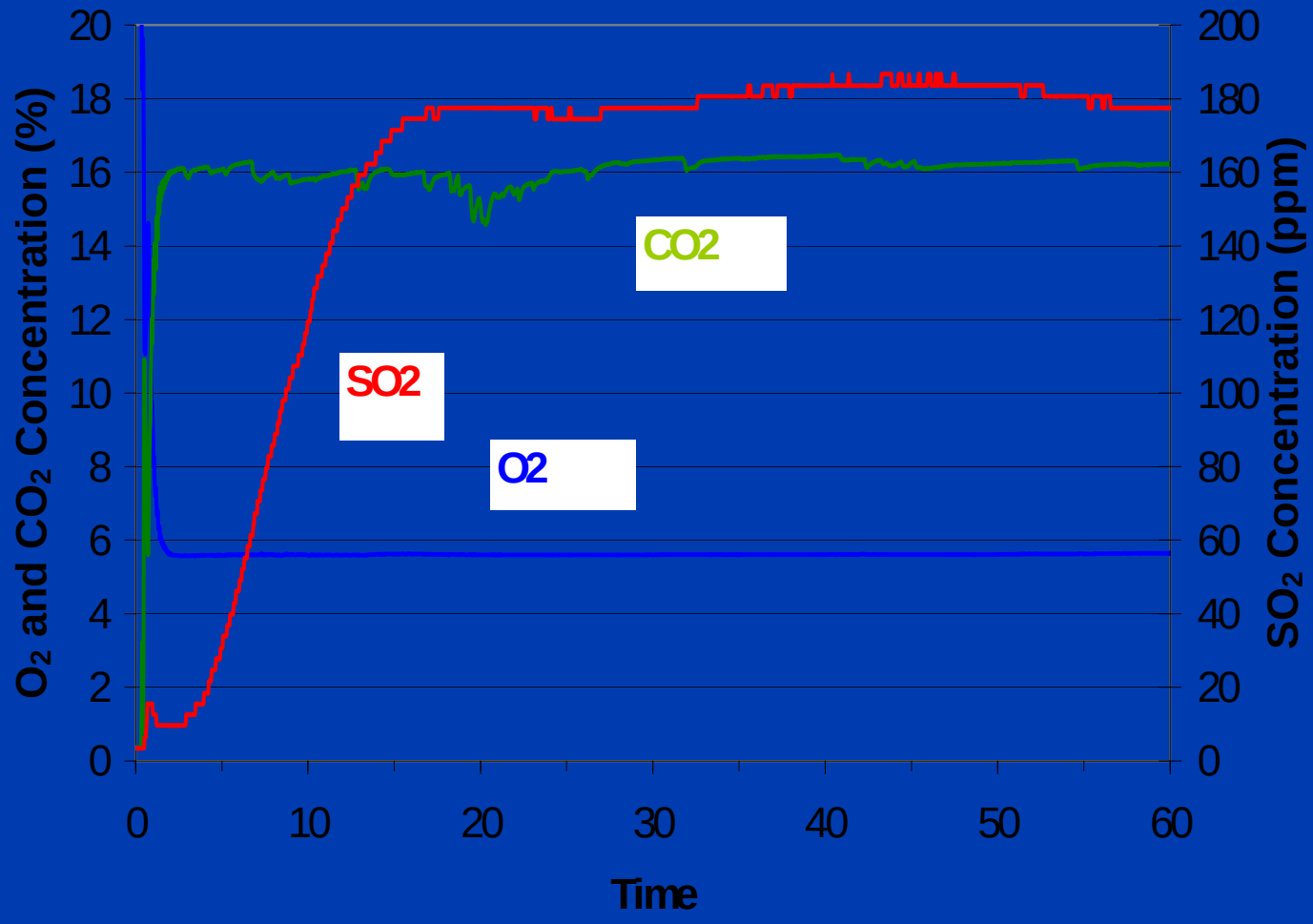
Condensable Emissions Test Improvements

Condensable Particulate Matter ARTIFACTS

- Compounds in the exhaust gas react to create artifacts under RM 202 sampling conditions, which contribute to a positive bias.

  - Example: Combustion sources may contain a significant amount of reactive sulfur under these conditions
    - Oxidation of SO_2 to SO_3
    - NH4HSO4 by-product

Immediate absorption of SO2 in water impingers (RM202)*



*John Richards, AWMA

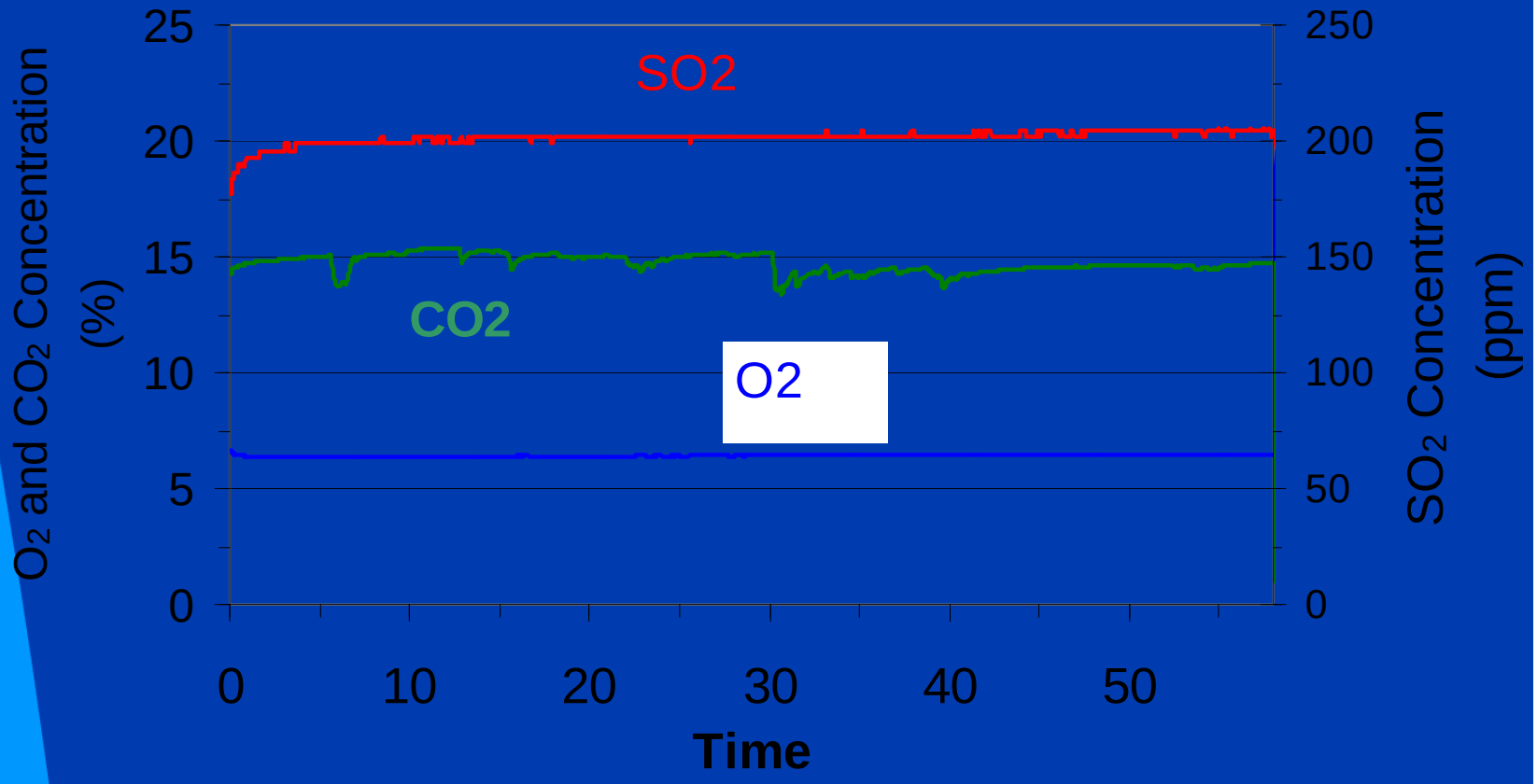
Condensible Particulate Emissions (CPM)

- New Particulate Sampling Method Introduced*
  - Condenser used to cool gases, eliminates water impingers (responsible for artifact formations)
  - Significantly reduces some artifact formations by over 90%
  - Method Hardware easily adaptable to current hardware (cost effective)

* John Richards, AWMA Conference, 11/05

Condenser Method

New Condensable PM Test Method
Eliminate water, eliminate interference*



*John Richards, AWMA

New CPM Method Status

- New CPM Method is defined as OTM28. OTM28 is currently available on EPA website and states are encouraged to use it now.
  - http://www.epa.gov/ttn/emc/prelim/otm28.pdf

- OTM28 is currently under EPA Internal Review.

- The latest “intel” is that EPA expects it to be published in the Federal Register by December, 2008.

What Should Sites Do?

- Be sure States are aware of transition time for using condensable emissions in limits and control requirements.
- Work with state regulators to persuade them not to require sources that discharge near ambient conditions to test for condensables.
  - Interim measures may focus on filterable PM, SOx, NOx – things that we can measure now.
- Utilize the new dry impinger method for condensables
  - You may need to educate the state first
  - Should be for “informational” purposes only

What should sites do - Watch Outs

- Check the basis of PM limits in your permit! If limits based on filterable PM only, be sure States do not require condensables testing for compliance w/ existing limits without revising limits.
- If new PM RACT limits are based on filterable PM 2.5 emissions data the RACT rule should specify compliance is based on filterable PM 2.5 emissions only.

Sites should be aware:

- Inventory and RACT development are complicated by lack of test method and data. Focus on SOx, NOx precursors.
- Emission factors for condensables developed using RM 202 are likely to be artificially high for many source categories.
- The dry impinger method is not the final solution for accurate condensable emissions. EPA is developing an air dilution method which will be the ultimate solution for measuring condensables.

Lead Standard

- First adopted in 1978 1.5 ug/m3 – quarterly average
- Proposed changes in May 2008
- U.S. EPA adopted standard of 0.15 ug/m3 – 3 month rolling average

Lead Standard

- 3 areas in Ohio with readings above new standard
- Cuyahoga County – 0.16 ug/m3
- Fulton County – 0.52 ug/m3
- Logan County – 0.26 ug/m3
- Highest in country – 2.26 ug/m3, Jefferson County, Missouri

Lead Standard

- More monitoring will be required – in areas over 500,000 population
  - Cincinnati
  - Dayton
  - Columbus
  - Toledo
  - Youngstown
  - Akron/Canton
  - Cleveland

Lead Standard

- More monitoring around sources greater than 1 ton per year
- Finalizing data – about 10 individual plants (power plants, lead furnaces, foundries) in Ohio
- Implementation plans are due June 2013 – attainment no later than January 2017
- Monitoring around source must begin by January 1, 2010
- New monitoring in urban areas must begin by January 1, 2011